

WHAT IS CLAIMED IS:

1 1. A method for conditioning a packaged powder, the method
2 comprising:
3 providing a receptacle having an enclosed chamber containing an amount
4 of a powder; and
5 providing at least one pulse of energy to the receptacle to increase the
6 efficiency at which the powder may be extracted from the chamber when flowing a gas
7 through the chamber.

1 2. A method as in claim 1, further comprising providing the pulse of
2 energy while the powder is sealed within the chamber.

1 3. A method as in claim 1, wherein the pulse providing step further
2 comprises quickly striking the receptacle.

1 4. A method as in claim 3, further comprising striking the receptacle
2 with an amount of energy of at least about 0.01 lbf-in.

1 5. A method as in claim 3, further comprising releasing a spring-
2 loaded lever to quickly strike the receptacle.

1 6. A method as in claim 1, wherein the pulse providing step further
2 comprises moving the receptacle past an arm that temporarily engages a portion of the
3 receptacle.

1 7. A method as in claim 1, wherein the pulse providing step further
2 comprises bending and quickly releasing receptacle to permit receptacle to strike a
3 surface.

1 8. A method as in claim 1, wherein the pulse providing step further
2 comprises providing a pulse of vibratory energy to the receptacle.

1 9. A method as in claim 8, further comprising contacting the
2 receptacle with a vibrating piezoelectric transducer to provide the vibratory energy.

1 10. A method as in claim 9, further comprising vibrating the transducer
2 at a frequency of at least about 10 kHz.

1 20. A system as in claim 19, further comprising a second spring that is
2 in contact with the trigger, wherein further movement of the receptacle causes the
3 receptacle to engage and move the trigger away from the lock to release the lever arm
4 which then strikes the receptacle.

1 21. A system as in claim 15, wherein the mechanism comprises a
2 bending device that is configured to bend and then quickly release the receptacle to
3 permit the receptacle to strike a surface.

1 22. A system as in claim 15, wherein the mechanism comprises an arm
2 that is mounted to a frame, and a movable platform to move the receptacle past the arm
3 while temporarily engaging the arm.

1 23. A system as in claim 15, wherein the mechanism comprises a
2 vibratable element that is configured to at least temporarily contact the receptacle.

1 24. A system as in claim 23, wherein the vibratable element comprises
2 a piezoelectric transducer.

1 25. A system as in claim 15, wherein the receptacle further comprises a
2 metallic body having a tab extending from the chamber.

1 26. A system as in claim 15, wherein the powder is composed of fine
2 particles having a mean size in the range from about 0.5 μm to about 5 μm .

1 27. A system as in claim 15, further comprising a container having an
2 enclosure, wherein the receptacle is held within the enclosure, and wherein the
3 mechanism is coupled to the container.

1 28. A system as in claim 27, wherein the container comprises a base
2 and a cover that is pivotally coupled to the base, wherein the base and the cover define the
3 enclosure.

1 29. A system as in claim 28, further comprising a coupling
2 arrangement that couples the receptacle to the base.

1 30. A system as in claim 28, wherein the mechanism comprises a hook
2 coupled to the cover that engages and then releases the receptacle when the cover is
3 pivoted to permit the receptacle to strike the base.

1 31. A system as in claim 29, wherein the coupling arrangement is
2 pivotally coupled to the base, and wherein the mechanism comprises a latch that is
3 operably coupled to the base, an arm that is coupled to the cover, and a cantilever beam
4 that is attached to the coupling arrangement, wherein the arm is configured to engage and
5 pivot the coupling arrangement as the cover is opened, and wherein the latch is
6 configured to engage and then release the cantilever beam when the coupling arrangement
7 is pivoted to permit the cantilever beam to strike the receptacle.

1 32. A system as in claim 31, wherein the latch is slidably coupled to
2 the base such that the latch may be moved over the cantilever beam after the receptacle
3 has been positioned within the enclosure.

1 33. A system as in claim 28, wherein the mechanism comprises a
2 spring that is coupled to the cover and a latch that is operably coupled to the base,
3 wherein the latch is operable to release the spring to permit the spring to strike the
4 receptacle.

1 34. A system as in claim 33, wherein the latch is slidably coupled to
2 the base such that the latch may be moved to release the spring after the cover has been
3 closed.

1 35. A system as in claim 15, further comprising a housing and a
2 plurality of receptacles that are stacked within the housing, and wherein the mechanism
3 comprises a biased striking member and a trigger that is movable between a home
4 position and a striking position, wherein movement of the trigger to the striking position
5 releases the striking member to permit the striking member to strike one of the
6 receptacles.

1 36. A system as in claim 35, further comprising an advancement
2 apparatus that is configured to advance the receptacles toward the striking member upon
3 movement of the trigger to the striking position, and further comprising a push plate

coupled to the trigger such that movement of the trigger back to the home position pushes a treated receptacle from the housing.

37. A powder dispersion device, comprising:
a housing that is adapted to receive a receptacle having an enclosed chamber containing an amount of a powder;
an aerosolization system in the housing to extract the powder from the receptacle and to entrain the powder in a gas stream to form an aerosol;
a mechanism to provide at least one pulse of energy to the receptacle prior to aerosolization to increase the efficiency at which the powder may be extracted from the chamber when flowing a gas through the chamber.

38. A device as in claim 37, wherein the mechanism comprises a striking device disposed in the housing to quickly strike the receptacle.

39. A device as in claim 37, wherein the striking device comprises a spring-loaded lever arm, and a release apparatus to release the lever arm.

40. A device as in claim 37, further comprising a pivotal latch having a lock that pivots as the receptacle is moved against the latch, and a trigger having a ramp, wherein the lock of the latch is slidable upon the ramp when the latch pivots to cause the lever arm to pivot and compress a first spring and cause the lock to engage the trigger to lock the lever arm in an energy storage position.

41. A device as in claim 40, further comprising a second spring that is in contact with the trigger, wherein further movement of the receptacle causes the receptacle to engage and move the trigger away from the lock to release the lever arm which then strikes the receptacle.

42. A device as in claim 37, wherein the mechanism comprises an arm that is operably mounted to the housing, and a movable platform to move the receptacle past the arm while temporarily engaging the arm.

43. A device as in claim 37, wherein the mechanism comprises a vibratable element in the housing that is configured to at least temporarily contact the receptacle.

2 a container that is adapted to hold a receptacle having an enclosed chamber
3 containing an amount of a powder; and

4 a mechanism coupled to the container that is operable to provide at least
5 one pulse of energy to the receptacle to increase the efficiency at which the powder may
6 be extracted from the chamber when flowing a gas through the chamber.

1 52. A device as in claim 51, wherein the container comprises a base
2 and a cover that is pivotally coupled to the base, wherein the base and the cover define an
3 enclosure which is adapted to receive the receptacle.

1 53. A device as in claim 52, further comprising a coupling arrangement
2 is adapted to couple the receptacle to the base.

1 54. A device as in claim 53, wherein the mechanism comprises a hook
2 coupled to the cover that is adapted to engage and then release the receptacle when the
3 cover is pivoted to permit the receptacle to strike the base.

1 55. A device as in claim 53, wherein the coupling arrangement is
2 pivotally coupled to the base, and wherein the mechanism comprises a latch that is
3 operably coupled to the base, an arm that is coupled to the cover, and a cantilever beam
4 that is attached to the coupling arrangement, wherein the arm is configured to engage and
5 pivot the coupling arrangement as the cover is opened, and wherein the latch is
6 configured to engage and then release the cantilever beam when the coupling arrangement
7 is pivoted to permit the cantilever beam to strike the receptacle.

1 56. A device as in claim 55, wherein the latch is slidably coupled to the
2 base such that the latch may be moved over the cantilever beam after the receptacle has
3 been positioned within the enclosure.

1 57. A device as in claim 53, wherein the mechanism comprises a
2 spring that is coupled to the cover and a latch that is operably coupled to the base,
3 wherein the latch is operable to release the spring to permit the spring to strike the
4 receptacle.

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1 58. A device as in claim 57, wherein the latch is slidably coupled to the
2 base such that the latch may be moved to release the spring after the cover has been
3 closed.

1 59. A device as in claim 51, wherein the container is adapted to hold a
2 plurality of stacked receptacles, and wherein the mechanism comprises a biased striking
3 member and a trigger that is movable between a home position and a striking position,
4 wherein movement of the trigger to the striking position releases the striking member to
5 permit the striking member to strike one of the receptacles.

1 60. A device as in claim 59, further comprising an advancement
2 apparatus that is configured to advance the receptacles toward the striking member upon
3 movement of the trigger to the striking position, and further comprising a push plate
4 coupled to the trigger such that movement of the trigger back to the home position pushes
5 a treated receptacle from the container.

1 61. A method for aerosolizing a powder, the method comprising:
2 placing a receptacle having a chamber containing an amount of a powder
3 into an aerosolization device having an aerosolization system for extracting the powder
4 from the receptacle and for entraining the powder in a gas stream to form an aerosol, and
5 a mechanism to provide at least one pulse of energy to the receptacle; and

6 providing a pulse of energy to the receptacle with the mechanism and
7 actuating the aerosolization system to extract the powder from the receptacle at about the
8 same.

1 62. A method as in claim 61, wherein the pulse of energy is provided
2 within about 100 ms before actuation of the aerosolization system to about 25 ms after
3 actuation of the aerosolization system.

1 63. A method as in claim 61, wherein the emitted dose is increased by
2 about 10% when the pulse of energy is provided at about the same time as actuation of
3 the aerosolization system.